Laetrile – The Answer to Cancer?

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The anti-cancer drug Laetrile is one of the most controversial subjects in the history of medicine. Laetrile's most ardent proponents consider it to be a natural cancer cure, literally built in to the normal "vitamin architecture" of mammalian food supplies as the primary natural exogenous cancer control for humans and animals. They have called Laetrile "vitamin B17." (1) Laetrile's opponents consider it, quite simply, as a "toxic drug that is not effective as a cancer treatment."

The term "Laetrile" was coined by the father/son team of Ernest T. Krebs Sr., M.D., and E.T. Krebs Jr. research biochemist. It is a contraction of the more formal name "LAEvo-mandeloniTRILE-glucoside." Yet over the past 40 years the chemical identity of Laetrile has changed, as the Merck Index notes: "The name amygdalin is currently used interchangeably with Laetrile…. [amygdalin is the] most common constituents of Laetrile ® preparations." (2) Amygdalin is actually d-mandelontrile bi-glucoside, equivalent to the Krebs' original Laetrile plus one extra sugar molecule [See Figure 1].

Both amygdalin and the original Krebs' Laetrile (also called "sambunigrin") are members of the class of beta-cyanogenetic glucosides, which includes others such as prunasin, dhurrin, and linamarin. Also calling them "nitrilosides", Krebs Jr. has defined them as "…water soluble, essentially non-toxic, sugary compounds found in… plants, many of which are edible…. They comprise molecules made of a sugar, hydrogen cyanide, a benzene ring or an acetone." (1) Krebs considers the class of nitrilosides to collectively constitute "vitamin B17." Krebs emphasizes the universality across the globe of "nitriloside/B17" – containing plants: "There are approximately 14 naturally occurring nitrilosides distributed in over 1,200 species of plants…. No area on the earth that supports vegetation lacks nitriloside-containing plants…. From the nitriloside rich salmon-berry… growing on the Arctic tundra and the arrow-grass growing in arctic marches and supplying the major fodder for the caribou, to the cassava or manioc – the bread of the tropics – plants extraordinarily rich in nitriloside, and serving as food for man and animals, are found in abundance." (3)

O.L. Oke has noted that "Cyanogenetic glycosides [nitrilosides] have been found in the following common vegetables: maize, sorghim, millet, field bean, lima bean, kidney bean…, sweet potato, cassava, lettuce, linseed [flaxseed], almond and seeds of lemons, limes, cherries, apples, apricots, prunes, plums and pears." (4) Thus Krebs has argued that their widespread presence in foods consumed by humans and animals all over the world argues against nitrilosides/laetriles being seriously or inherently toxic. Krebs also believed this gives "laetriles" the status of "accessory food factors," rather than their being a "drug," alien to normal human metabolism.

Purified amygdalin was first prepared in 1830 by the French scientists Roubiquet and Boutron-Charland. In 1837, the German scientists von Liebig and Woehler found that amygdalin can be split by a specific enzyme into hydrogen cyanide, benzaldehyde, and glucose. The first recorded use of "Laetrile" to treat cancer was reported in 1845 by T. Inosmetzeff, a professor at the Imperial University of Moscow. (5,6) A young male cancer patient of 20 received approximately 46,000 mg of amygdalin over a period of 3 months, and was still alive 3 years later. A women of 48, with extensive metastasis from a primary right ovarian tumor, received varying amounts of amygdalin over a period of years and had survived 11 years at the time of the report. No sustained pharmacologic harm was seen with these patients.

In the modern era Laetrile was "rediscovered" in the 1940s by the Krebs. By the late 1940s – early 1950s, use of Laetrile to treat cancer had spread quietly around the world. Early dosages were extremely modest – only 50 – 100 mg by intravenous injection, with total patient dosage then seldom exceeding 2 grams. By the 1960s the Krebs were recommending 30 grams total Laetrile dosage, spread over a 10-30 day treatment course. (7) By the 1980-90s, intravenous dosages up to 9 grams, with total patient dose reaching 2-300gms, was not uncommon. (8) Classical Laetrile proponents, such as Krebs, Dean Burk, and P. Binzel, do not consider Laetrile a literal cancer cure, however, anymore than insulin injections are a "cure" for diabetes. Rather, Laetrile is considered a cancer control which will need to be taken indefinitely, in oral form, after the original "cancer crisis" is brought under control. This exactly parallels the situation of vitamin deficiency diseases, where intravenous injections may be used to bring a severe vitamin deficiency disease (e.g. pellagra or beriberi) under control, with higher-than-normal oral doses needed indefinitely thereafter to prevent relapse. The typical oral Laetrile dose used after intravenous injections is 1 to 2 grams/day. (8) Yet Krebs suggested that 50-100 mg of Laetrile/day might suffice to prevent cancer in normal healthy adults. (1)

The "proof" of Laetrile's efficacy in preventing/controlling cancer has come from 3 different sets of data: epidemiological, animal tests, and human clinical use by experienced pro-Laetrile doctors. The epidemiological evidence for Laetrile is controversial, like all epidemiological evidence, and provides only strong suggestions, not incontrovertible proof.

As Krebs points out, "Tribes in the Karakorums of West Pakistan [the Hunzas], the aboriginal Eskimaux, tribes of South Africa and South America living on native foods, the North American Indian in his native state, the Australian aborigines and other native or so-called primitive peoples rely upon a diet containing as much as 250 to 3000 mg of nitriloside in a daily ration. Civilized, Westernized… man, on the other hand relies on a diet that probably provides on average less than 2 mg nitriloside a day". (3) Among these people, cancer tends to be rare compared to the high rates present in America and Europe. For example, Sir Robert McCarrison, famed medical nutritionist in the 1920s – 30s, failed to discover a single case of cancer among the Hunzas during a 20 year period, while John Clark, M.D., a later medical missionary among the Hunza, also failed to find cancer among them. (3) The Hunza diet is based in significant part upon the apricot kernel, a rich source of Laetrile, which typically provides them with at least 150 – 250 mg "B17"/day. (3)

Among the Eskimaux living on their native diet, cancer was also so rare that it prompted famed anthropologist/explorer V. Steffanson to write a book on the subject: Cancer: Disease of Civilization? (9) Krebs notes that the salmon-berry is a rich nitriloside source, and is used by traditional Eskimaux to make pemmican, which is eaten year-round. The contents of caribou stomachs, partially-digested grasses unusually rich in nitrilosides, are a prized delicacy among the Eskimaux. (3)

Dr. M. Navarro of Santo Tomas Univ. of Manila, was a world-famed ancologist who was also an early Laetrile clinical pioneer. "By 1977 he had linked the low incidence of cancer in the native populations of Mindanao [the Philippines] to the continual ingestion of many sources of vitamin B17. That rate, about 1 per 100,000 [less than 1% of the U.S. cancer rate], is even smaller than the low rate of cancer in the nonurban Filipino north, where generations of Filipinos have subsisted on [nitriloside-rich] cassava, wild rice, wild beans, berries and fruits of all kinds." (10)

In a letter to Dean Burk, pro-Laetrile head at that time of the Cytochemistry Dept. of the NCI, Krebs wrote concerning North American Indians: "I have analyzed from historical and anthropological records the nitriloside content of the diets of… carious North American tribes…. Some of these tribes would ingest over 8,000 mg of vitamin B17 (nitriloside) a day. My data on the Modoc Indians are particularly complete." (12) As an example of the low cancer incidence among Indians eating their high "B17" native diet, Krebs cited a report on the Navajo-Hopi Indians from JAMA, Feb. 5, 1949: "…the doctors wondered if [the Indians' diet] had anything to do with the fact that only 36 cases of malignant cancer were found out of 30,000 admissions to Ganado, Arizona Mission Hospital… In the same population of white persons, the doctors said that would have been about 1800." (12)

In his preface to A. Berglas' book Cancer: Cause and Cure, medical missionary Dr. Albert Schweitzer wrote that "On my arrival in Gabon [Africa] in 1913, I was astonished to encounter no cases of cancer. I saw none among the natives two hundred miles from the coast…. I can not, of course, say positively that there was no cancer at all, but, like other frontier doctors, I can only say that, if any cases existed they must have been quite rare. This absence of cancer seemed to be due to the difference in nutrition of the natives compared to the Europeans…." (13) Of course, such high nitriloside foods as cassava, millet, maize and sorghum are staples of the traditional African diet. Cassava may contain from 225 to 1830 mg/kg of the nitriloside linamarin (10)

The world wide epidemiological picture is consistent. Wherever "primitive peoples" eat their traditional natural diet, their intake of nitrilosides is high, and their cancer incidence is low. And when, as among many modern Eskimo, they gain easy access to and become reliant upon the "civilized" Western diet of sugar, white flour, and refined/preserved foods, their cancer incidence shoots up and approximates the high incidence of Euro-American people.

ANIMAL LAETRILE TESTS

There have been various animal studies that suggest an anti-cancer effect from Laetrile. "…the SCIND Laboratories in California conducted several experiments [with Laetrile]…. In their second study on carcinoma of rats (Walker 256), with amygdalin in doses of 500 milligrams per kilogram injected intraperitoreally on days one, three and six after [transplanted] tumor take, the following results were found:

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DAYS SURVIVAL TIME
Controls:
19,19,19,19,20,20,22,22,22,22,24,24,24,25,25,26,26,26,26


Treated:
27,28,28,28,29,29,29,30,30,30,30,30.31,32,32,32,60,60,60,60 (U.S SENATE, 1977:419)"
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The mean survival time of the control rats was thus 23 days. With the amygdalin-treated rats, mean survival time was 38 days, i.e. a 70% increase over the controls. The survival time of every Laetrile-treated animal was greater than that of every control animal.

"…in a test by Dr. Paul Reitnauer, chief biochemist of the Manfred von Ardenne Institute, Dresden (East Germany), 20 of 40 H-strain mice were given bitter almonds in addition to their standard diet. Bitter almonds contain relatively high levels of Laetrile. Fifteen days after initiation of this regimen, all 40 mice were inoculated with 1 million Ehrlich ascites [cancer] cells. The 20 control mice lived an average of 21.9 days following this injection. The 20 mice receiving the bitter almond supplement lived an average of 25.8 days, which was statistically significant…." (14)

"In 1977, Dr. Vern L. van Breeman of Salisbury State College, Maryland, reported that the addition of apricot kernels [rich in Laetrile] to standard food in pilot experiments with special strains of mice bred to develop breast cancer and leukaemia showed impressive differences both in terms of developing the disease and increased survival times between the animals that [ate] the kernels and those that did not. When he reported his early findings… seven of the animals in the leukaemia control group and five in the breast cancer [control] group had died, while none of the mice on the kernels had. Ultimately only one of the mammary cancer mice developed a slow-growing tumor, and, while the leukaemia results were less impressive in terms of total symptoms, leukaemia-prone mice that ate apricot kernels enjoyed life extensions up to 50% over what would normally be expected." (10)

Veteran cancer researcher Kanematsu Sugiura (who had a 4-volume set of his collected scientific papers published in 1965) performed three sets of experiments between September 1972 and June 1973 "to determine the effects of amygdalin…upon mice with spontaneous mammary tumors." In an internal report to his colleagues at Sloan-Kettering Institute, he said that "The results clearly show that amygdalin significantly inhibits the appearance of lung metastases in mice bearing spontaneous mammary tumors and increases significantly the inhibition of the growth of the primary tumor over the appearance of inhibition in the untreated animals." (15)

These are just some of the Laetrile animal studies yielding positive results, while they hardly prove Laetrile to be a "cure" for cancer (which scientific Laetrile proponents have never claimed it to be), they clearly evidence some anti-cancer effect.

HUMAN LAETRILE CLINICAL EXPERIENCE

In 1962 Dr. John Morrone reported his results from using Laetrile with 10 patients suffering from "inoperable cancer." The treatments ranged from 4 to 43 weeks in length, and a range of 9 to 133 grams Laetrile was given through intravenous injections. Morrone concluded his report: "The use of Laetrile… in 10 cases of inoperable cancer, all with metastases, provided dramatic relief of pain, discontinuance of narcotics, control of fetor [stench from a tumor], improved appetite, and reduction of adenopathy [swollen lymph nodes]. The results suggest regression of the malignant lesion…. No other side effects [other than transient episodes of low blood pressure] were noted except slight itching and a sensation of heat in the affected areas, which was transitory in all cases." (16)

In 1994, P.E. Binzel published his results from treating cancer patients with Laetrile between 1974 and 1991. He used a combination of intravenous and oral Laetrile. Intravenous doses started with 3 grams and worked up to 9 grams. After a period of months, oral Laetrile, 1 gm at bedtime, was begun in place of the injections. Binzel also used various nutrient supplements and pancreatic enzymes, as well as a low animal-protein, no junk-food diet as part of his regimen. Out of a series of 180 patients with primary cancer (non-metastasised, confined to a single organ or tissue), 138 were still alive in 1991 when he compiled his treatment results. At that time, 58 of the patients had been followed for 2 to 4 years, while 80 had a medical follow-up from 5 to 18 years. Of the 42 patients who had died by 1991, 23 died from their cancers, 12 from unrelated causes, and 7 died of "cause unknown."(8)

Among his metastatic cancer patients, 32 of 108 died from their disease, while 6 died of unrelated causes, and 9 died of "cause unknown." Of his 61 patients still alive in 1991, 30 had a follow-up between 2 and 4 years, while 31 had been followed for 5 to 18 years. (8)

Binzel's results are impressive. Some of the individual patients discussed in his book were still alive (and well!) 15-18 years after their initial Laetrile treatment. Binzel also notes that none of the cancer diagnoses were made by him (a small town, "family doctor") – all patients had diagnoses from other physicians. Many had already suffered the ravages of standard "cut-burn-and poison" (surgery/X-ray/chemotherapy) oncological medicine before being given up as hopeless cases by orthodox doctors.

Other physicians who have worked with Laetrile have also reported favorable results using it. Thus Manuel Navarro, M.D., former professor of medicine and surgery at the Univ. of Santo Tomas in Manilla wrote in 1971: "I… have specialized in oncology [the study of tumors] for the past eighteen years. For the same number of years I have been using Laetrile-amygdalin in the treatment of my cancer patients. During this eighteen year period I have treated a total of over five hundred patients with Laetrile-amygdalin by various routes of administration, including the oral and the I.V. The majority of my patients receiving Laetrile-amygdalin have been in a terminal state when treatment with this material commenced.

"It is my carefully considered clinical judgement, as a practicing oncologist and researcher in this field, that I have obtained most significant and encouraging results with the use of Laetrile-amygdalin in the treatment of terminal cancer patients, and that these results are comparable or superior to the results I have obtained with the use of the more toxic standard cytotoxic agents." (11)

Many of the physicians whose anti-cancer programs are detailed in Burton Goldberg's 1116 page Alternative Medicine Definitive Guide to Cancer also report positive Laetrile results as part of their cancer treatment programs. Robert Atkins, M.D., notes that "Amygdalin appears to neutralize the oxidative cancer-promoting compounds such as free radicals…. It's just one more key component for keeping cancer from growing or spreading. Contrary to what people have said about Laetrile… it should be considered an effective, entirely safe treatment for all types of cancer." (17)

Dr. Ernesto Contreras has used Laetrile as a cornerstone of his cancer practise since 1963. He remarks that "For the prevention of cancer and the maintenance of remission, there is nothing as effective as Laetrile…. Its non-toxicity permits its use indefinitely while surgery, radiation and chemotherapy can only be administered for a limited time…. the majority of cancers that occur more frequently, such as cancers of the lung, breast, colon, ovaries, stomach, esophagus, prostate, and the lymphomas, are much helped by Laetrile." (17)

Dr. Michael Schachter, who has used Laetrile for 20 years with cancer patients, remarks that "As part of a comprehensive health-enhancing program, amygdalin is a useful natural; substance for fighting cancer." (17) Dr. Schachter recommends using cysteine (N-acetyl-cysteine is a better-absorbed form of cysteine) along with amygdalin, to maximize the body's ability to detoxify any cyanide released from the Laetrile. (17)

Dr. Douglas Brodie also uses Laetrile to treat his cancer patients. "After years of observing patients using amygdalin, we can say with complete assurance that it is neither toxic nor worthless…. Nor do we find it to be a cure or panacea for cancer. The experience of our clinic… is that amygdalin has the ability to improve the patient's sense of well-being, relieve the pain of cancer, and reduce the requirement for pain medicine," (17)

Dr. Hans Nieper is a world famous oncologist and the developer of the standard anti-cancer cytotoxic drug cyclophosphamide. In 1970 he co-authored a brief paper on Laetrile with Dean Burk, in which they stated that "…in the treatment of cancer, the active principle of nitrilosides is to be used mainly in prophylaxis [prevention] and early protective therapy…. On the other hand, the complete atoxicity [lack of toxicity] of this method of treatment, which is maybe nothing else but a rediscovered natural principle, permits the unlimited use of this substance." (18) In 1972 Nieper told reporters while in the U.S.: "After more than 20 years of such specialized work, I have found the non-toxic Nitrilosides – that is, Laetrile – far superior to any other known cancer treatment or preventive. In my opinion it is the only existing possibility for the ultimate control of cancer." (11)

It should thus be clear that among doctors who have worked with Laetrile, its anti-cancer effect is highly regarded. The combination of epidemiological evidence, animal studies and informed clinical opinion supports the belief that Laetrile has significant anti-cancer effect. This is perhaps why the anti-Laetrile medical establishment has focused on scaring people away from Laetrile use through the "great cyanide scare."

THE LAETRILE-CYANIDE CONNECTION

All 14 nitrilosides are 3-part molecules: sugar, cyanide, and either benzaldehyde or acetone. (3) It is thus literally true to say that Laetrile contains cyanide, a deadly poison. Yet it is also true to say that table salt, sodium chloride, contains the deadly poison, chlorine. Under normal conditions, the chlorine in salt and the cyanide in Laetrile is tightly bound, in no danger of suddenly "leaking out."

Enzymes called "beta-glucosidase" and "beta-glucuronidase" can liberate the cyanide from nitrilosides. In the 1940s Fishman and Anlyan discovered that malignant cancerous tissue contains significantly more beta-glucuronidase than normal tissue (19,20,21,22): "Tissue excised from malignant neoplasms [cancers] of various organs, including breast, uterus, stomach,… abdominal wall, and esophagus were found to contain 100 to 3600 percent more glucuronidase activity than uninvolved adjacent tissue. Metastases to lymph nodes from cancers originating in various organs… contained B-glucuronidase in higher concentrations than the uninvolved lymph nodes." (19) "…elevated B-glucuronidase is probably a characteristic of malignant cells." (20)

"In addition to their high levels of B-glucuronidase, malignant lesions are characterized by a generally profound deficiency of… rhodanese, as was reported by Homberger, Mendel, Rodney and Bowman. Rosenthal reported an 80% decrease in rhodanese in [cancerous] liver tissue, and a similar decrease was found in the leukemic invasion of tissues." (7)

These two properties of cancer cells – an "excess" of Laetrile-splitting glucuronidase and a deficiency of cyanide-detoxifying rhodanese – are presumed by laetrilists to provide the explanation of both why Laetrile kills cancer cells, and why it is mostly harmless to normal cells. Circulating Laetrile will be preferentially split by cancer cells into cyanide, benzaldehyde and sugar. They will them be poisoned, since cancer cells lack (relatively) the cyanide – detoxifying enzyme rhodanese. If some cyanide "spills out" from the cancer cells, adjacent normal cells will then be able to detoxify it through their rhodanese enzymes. As O.L. Oke notes, "If detoxification is equal to absorption, no death [or injury] occurs no matter the amount [of cyanide absorbed]." (4)

The enzyme rhodanese combines cyanide with sulfur (from the amino acid cystine) to yield the relatively harmless substance "thiocyanate." As Oke notes, "[rhodanese] is widely distributed in all the tissues with the highest concentrations in the liver. Detoxification can therefore take place in all parts of the body but with the liver as the chief site… When hydrocyanic acid [cyanide] is converted to thiocyanic acid [thiocyanate] there is a 200-fold reduction in toxicity." (4)

BENZALDEHYDE

When beta-glucosidase or beta-glucuronidase splits Laetrile, it releases benzaldehyde (BA) as well as cyanide. Various human studies have used BA itself as an anti-cancer drug (31,32,33,34). Kochi et al noted that "Toxic effects, including hematologic or biochemical disturbances, were not seen during long-term successive administration of [BA]." (32) They reported 19/57 inoperable terminal cancer patients "responded completely," while 10 patients responded partially (i.e. greater than 50% tumor reduction). (32) Tatsumura and colleagues used a mean total dose of 393 gms of BG, a BA derivative that is believed to convert to BA in the body, to achieve a positive response rate in 10/24 cancer patients. "Careful monitoring showed no toxic action of BG at these large doses. Complete necrotic liquefaction of tumour, without any damage to surrounding tissue, was seen in 2 of 3 cases in which histological [microscopic tissue] examination was feasible." (34)

Dean Burk declared in 1971 at the Seventh International Congress of Chemotherapy in Prague: "In vitro tests with Ehrlich Ascites carcinoma [a type of cancer cell culture] revealed that, where cyanide alone killed one percent of the cells and [BA] alone killed twenty percent, a combination of the two was effective against all the cells. Amygdalin with glucosidase… added also succeeded in killing 100 percent of the ascites tumor cells, due to the freeing of the same 2 chemicals." (11) Thus Laetrile may actually kill cancer cells through a synergistic cytotoxic reaction between its two key breakdown products, cyanide and benzaldehyde.

THE SAFETY OF LAETRILE

Both human and animal data have shown the relative non-toxicity of Laetrile. A 1980 report stated that "Amygdalin given to male Swiss-Webster mice…at 3g/kg… was able to protect against the diabetogenic action of alloxan…amygdalin…can be tolerated by experimental animals at rather high doses." (26)

"In a series of tests on adult mice, Dr. Dean Burk reported that they could live in perfect health to extreme old age when their normal diet consisted of fifty percent defatted apricot kernels…[which] provided each mouse with a whopping one-hundred and twenty-five milligrams of vitamin B17 per day." (11) As noted earlier, J. Morrone in his 1962 paper specifically commented on the absence of side-effects from Laetrile, while Binzel makes no mention of toxic side-effects among his patients. Drs. Atkins, Contreras, Brodie, and Nieper previously cited also specifically referred to Laetrile's absence of toxicity.

Ironically, one record of Laetrile's high degree of safety, when properly used, was provided by a group of Laetrile opponents, led by Dr. Charles Moertal. In 1981 in JAMA, Moertal and co-workers wrote: "In our study, intravenous amygdalin was found to be free of clinical toxicity and no cyanide could be detected in the blood… In summation, the administration of amygdalin according to the dosages and schedules we employed seems to be free of significant side-effects. This conclusion appears to be validated by early observations in phase II study of 44 Mayo Clinic patients receiving intravenous amygdalin therapy and 37 receiving oral therapy who have not experienced any symptomatic toxic reaction." (27) Yet in an obvious display of their anti-Laetrile bias Moertal et al concluded the one paragraph summary abstract on the first page of their paper with the statement "A definite hazard of cyanide toxic reaction must be assumed, however….," even though they state plainly in the conclusion of their report that they didn't find any Laetrile toxicity!

A 1960 study used sodium cyanide as a cancer drug with some degree of success in both humans and animals. When Smith and his colleagues treated cancer patients with an intravenous cyanide infusion, they reported that "The recovery and convalescence of these patients treated with sodium cyanide was indistinguishable from that of patients who had not received cyanide. There was no observed delayed clinical toxicity. All patients recovered promptly from the cyanide treatment and no latent or residual effects could be noted." (28) This is further evidence that Laetrile's "timed release," "special delivery to cancer cells" action should generally be of low toxicity, since sodium cyanide instantly dissociates into free cyanide in tissues, unlike Laetrile.

The lengths that Laetrile opponents would go to in an attempt to discredit Laetrile through the "cyanide toxicity scare" was illustrated by the infamous 1978 "Laetrile Toxicity Studies in Dogs," (29) 10 dogs were force fed a special mixture of 1-4 grams Laetrile combined with a finely ground raw almond paste/water mixture, which had been pre-incubated at body temperature in blood bags for 15-60 minutes. Almonds are one of the highest beta-glucuronidase (i.e. Laetrile cyanide-releasing) – containing foods known. Incubating Laetrile with an almond/water paste at body temperature for 15-60 minutes will thus serve to pre-release the cyanide normally "locked up" in Laetrile. Thus the dogs were force-fed large quantities of free hydrogen cyanide! Not surprisingly, four of the dogs were neurologically impaired, while 6 died. What this experiment proved is that large amounts of hydrogen cyanide, force-fed, are toxic. This is the basis of the so-called 'gas chamber" used to execute criminals in some American states, although there the hydrogen cyanide is produced by dropping potassium cyanide pellets into acid. The experimental results merely duplicated, in a roundabout way, the efficacy of the gas chamber. They did not prove anything about the normal action of Laetrile, taken intravenously or on an empty stomach, which is the standard protocol for Laetrile use. The dog experiment was like trying to prove that all cars are inherently deadly, on the grounds that everyone who drives a car without airbags at 120 miles per hour into a brick wall without wearing a seatbelt will be killed!

Another protective mechanism (aside from rhodanese) humans have when taking Laetrile orally (on an empty stomach) is through the interaction of cyanide with stomach hydrochloric acid. O.L. Oke points out that "Horses and hogs, like human beings,… have only one stomach which is strongly acid due to the presence of hydrochloric acid. This acid reacts with hydrocyanic acid [cyanide] to form much less toxic substances like acetic acid [vinegar] and ammonium chloride thereby causing an almost immediate detoxification as soon as the hydrocyanic acid is liberated from the glucoside [i.e. Laetrile]." (4)

LAETRILE: SAFE USAGE

When Laetrile is used therapeutically, it is usually given either intravenously, at doses from one to nine grams, or orally, at doses of 500mg, two to four times daily. To maximize the safety and effectiveness of oral Laetrile, it is imperative that it be taken on an empty stomach, either two hours before or three hours after a meal. Never combine oral Laetrile with raw almonds or raw apricot kernels, or raw vegetable or bean sprouts, as these are high in the cyanide-releasing beta-glucosidase enzyme. According to Krebs (the "father" of Laetrile), approximately 50-200 mg/day of Laetrile, taken like vitamins (which Krebs believed Laetrile to be) on an open-ended, on-going basis, will provide a cancer-preventive effect. Assuming one has not eaten for at least three hours before retiring, taking a small Laetrile preventive dose at bedtime may be the best strategy. Laetrile ingestion may occasionally cause a temporary low blood pressure reaction due to formation of thiocyanate, a powerful blood pressure lowering agent. (30)

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